



Logicube OmniSAS™ User's Manual

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1. Introduction to the Logicube OmniSAS™

Introduction



Congratulations on your purchase of the Logicube OmniSAS™. The OmniSAS™ is designed to be easy enough to be used by a novice, yet offers many professional features that are not available anywhere else.

The Logicube OmniSAS™ copies the contents of one hard disk drive to up to five drives simultaneously. The first drive is typically called the Master, while the others are termed Targets. The OmniSAS™ first analyzes the partitions on the Master, then acts according to a user set mode. Depending on the mode, the unit will adjust structures to ensure the validity of the Targets. This process is called disk cloning.

This manual covers the following Logicube product:
OmniSAS™

What Are Partitions?

Partitions are areas on the drive that define a storage unit. Each partition is represented by a drive letter at the operating system level (e.g. C:, D:,...). For that reason, partitions are commonly called **logical drives**, or **volumes**. A partition is also associated with a file system, or a structure for laying out files on the partition. We will use the four words interchangeably throughout this manual.

Hundreds of different types of file systems have been designed through the years. The most common are FAT16, FAT32, and NTFS.

FAT16 – The file system used by DOS since version 3.3. This file system can be at most 2GB in size, and can be used under Windows 95, 98, NT, 2000, Me, and XP. FAT stands for File Allocation Table, which has entries that are 16-bit wide.

FAT32 – Supported by Windows 98, 2000 Me, and XP. Entries in the FAT32 file system are 32-bits each thus eliminating the 2GB limit and offering an improved space efficiency.

NTFS – Supported by Windows NT, 2000, WinXP, Vista, and 7. Offers improved access speed, and some security and recoverability features.

The Logicube OmniSAS™ is “aware” of the above three file systems and will clone them over “intelligently”. Other types of partitions are handled in Mirror Copy™ mode and explained later in this manual.

Specifications

Power Requirements	90 to 230VAC 47 to 63Hz
Power Consumption	>10 watts w/o drives
Operating Temperature	5°- 60°C
Relative Humidity	10%-80%
Net Weight	20lb
Dimensions	17" W x 18" H x 6" D
Agency Approvals	RoHS compliant FCC Part 15 Class A, CE

Features

- The OmniSAS™ clones SAS, Serial ATA most SCSI drives (with the SCSI option installed) and IDE drives with the use of an adapter.
- Destination drives can of the following type can be cloned SAS, Serial ATA and IDE drives with the use of an adapter.
- Data transfer rates up to 5.2 GB/min 1-to-1 (SAS) and up to 1.7 GB/min 1-to-5 (SAS).
- Master and Target drives can be of different size, make, model and type.
- Master drive can contain up to 24 partitions.
- Automatically scales FAT16/32, NTFS 4.0/5.0/6.0, and Windows 2000/ME/XP/VISTA partitions.
- Optional diagnostics software for Department of Defense (DoD) specification data wiping.

Using this guide

This user guide is made up of 8 sections:

- Introduction
- Getting Started (Fast Start)
- Cloning Modes and Settings
- Omnidiagnostics™
- Software Loading Instructions
- Frequently Asked Questions
- Index

Please read Section 1. *Introduction*, and Section 2. *Getting Started* before attempting a drive cloning session. It is recommended that you practice with a scratch drive to fully appreciate all of the features.

System description

The complete Logicube OmniSAS™ system includes the following:

- The Logicube OmniSAS™ unit.

- For the OmniSAS™, six (6) SAS/SATA cables, are provided. These cables supply power to the drives.
- One (1) USB cable which can be used to update the unit's software.
- An AC power cord.
- This manual.

NOTE: Please contact Logicube Technical Support at (818) 700-8488 X3 if any of the above pieces are missing between the hours of 8am–5pm PST, Monday through Friday, excluding U.S. legal holidays.

Caution: Avoid dropping the Logicube OmniSAS™ or subjecting it to sharp jolts. When in use, place it on a flat surface.

Caution: Keep the unit dry. If you need to clean your Logicube OmniSAS™, use a lightly damp, lint free cloth. Do not run the cloth over the top cooling grid as moisture could get inside the unit. Avoid using soap or other cleaning agents particularly those containing bleach, ammonia, alcohol or other harsh chemicals.

Caution: Do not attempt to service the Logicube OmniSAS™ yourself! Doing so may void the warranty. If your unit requires service, please contact Logicube Technical Support for assistance.

2. Getting Started (Fast Start)

Applying power to the Logicube OmniSAS™

The Logicube OmniSAS™ is able to detect the capacity, C/H/S stats and the partition table of any SAS drive that is attached to the Master or Target positions. The OmniSAS™ can also detect the same settings on any IDE, SATA or SCSI drive that is attached to the Master position.

NOTE: Never “daisy chain” more than one SCSI drive to the Master position when the SCSI option is enabled. The unit can only handle one drive of any type in any position.

Adjusting Contrast

To adjust the displays contrast setting, press the HELP button. A bar graph positioned towards the bottom portion of the HELP display can be increased or decreased using the Left and Right navigation (arrow) buttons. Moving the bar increases or decreases the displays contrast setting.

Connecting Drives to the OmniSAS™

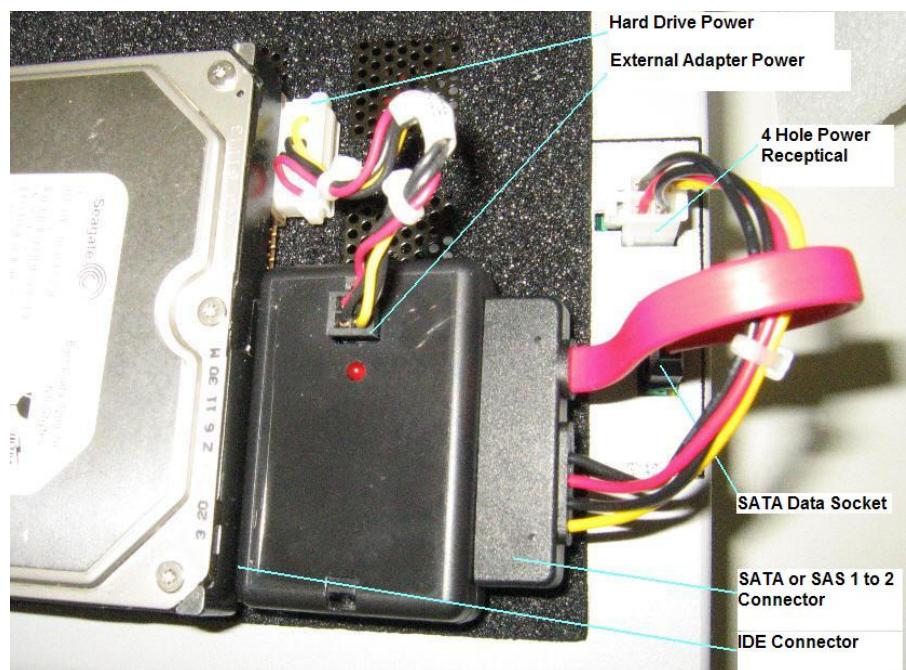
1. You will notice that there is a corresponding data and power connector for each of the Target drive positions. The Master position has both a SAS and SCSI data connector along with a single power connector.

NOTE: The Master position can hold a single drive – SAS, SATA or SCSI or IDE (ATA).

2. To attach a SAS drive, plug the SAS data cable into the SATA data socket and the SAS cables power plug into the 4 hole power receptacle to the right of the drive bay.
3. Attach the opposite end of the cable to the SAS drive.

4. To attach an IDE drive, connect a 40-pin IDE to SATA external adapter (Optional) to the IDE connector on the hard drive. Plug a drive power cable between hard drive power and the IDE to SATA external adapter. Next, connect a 1 to 2 SATA or SAS cable to the SATA side of the external adapter. Connect the SATA end of the 1 to 2 cable to the drive bay's SATA data socket. Locate the power portion of the 1 to 2 cable and plug it into the corresponding 4-hole power receptacle on the chassis of the drive bay. See Figure 1.

Figure 1.



NOTE: The drive will not actually be powered until a copy operation is started.

5. To attach a SCSI Master drive (with the SCSI option enabled), plug the 68-pin ribbon cable into the SCSI data socket such that the red line is near the power connector, (4-hole receptacle). Plug a drive power cable into the corresponding power receptacle.
6. Attach the opposite ends of the cables to the Master SCSI drive.

NOTE: The drive will not actually be powered until a copy operation is started.

7. Connect the remaining cables to their respective SAS, SATA or IDE (with external adapter) connectors for each Target drive position.

Things to remember:

The OmniSAS™ supplies power to all drives during a cloning session. There is no need to connect an external power source to the drives.

It is OK to connect and disconnect Master or Target drives while the OmniSAS™ is powered or idle. However, do NOT connect or disconnect drives during a cloning session. The Status light will typically blink to indicate that the unit is cloning.

The OmniSAS™ boots through the CF containing the system software. As such the CF must always be present in the CF bay.

If the CF is removed, the unit should be rebooted as soon as the CF is placed back into the OmniSAS™.

Adapters for other types of SCSI drives

Logicube sells specialized adapters that allow the following types of SCSI drives to be connected to the Logicube OmniSAS™:

- 80-pin Adapters for connecting drives with SCA-80 connectors.
- 50-pin Adapters for connecting drives with old-style SCSI-1 connectors.

Adapters for other types of SATA drives

- Support for eSATA drives (with an optional cable)
- 1.8" micro-SATA drives (Support of micro-SATA drives with an optional cable. Call Logicube for availability).

Adapters for other types of drives

Logicube sells optional adapters that allow the following types of specialized drives to be connected to the Logicube OmniSAS™

Note: IDE type adapters will require the use of the IDE/PATA cloning adapter to interface with the OmniSAS™.

- 1.8" Laptop drives, (e.g. Toshiba iPod™ drives).
- 1.8" ZIF drive adapter
- IDE/PATA cloning adapter
- 2.5" IDE Laptop drive adapter

Other specialized adapters are also available. If you are unsure about the type of drive that you have, please contact Logicube Technical Support for assistance.

Power and Reset buttons

Please refer to **Figure 2** below for exact switch/button locations.

The Logicube OmniSAS™ includes two On/Off switches and one reset button. One power switch is a rocker switch that is located on the unit's power supply. The other power and reset buttons are located on the back of the unit.

Looking at the back of the OmniSAS™, the reset button is on the right and the power button is on the left, (near the power supply).

When the unit needs to be soft-booted (or power cycled), press the reset button and hold it in momentarily. Wait a couple of seconds and let go, the unit will reboot and be ready to use in 60 seconds. (90 seconds if the SCSI option is present)

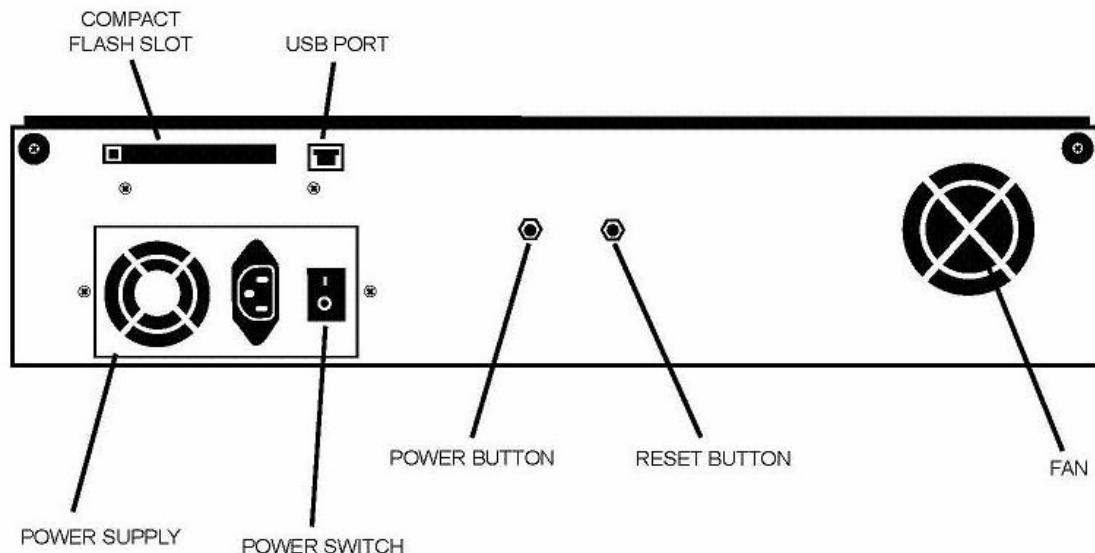
NOTE: User settings are retained after the unit is restarted.

If the unit needs to be hard-booted, press the momentary style power button for 4 seconds and release. This will shut the unit off. Wait a few seconds for the drives to stop spinning then press the power button again for 2 to 3 seconds. The unit will reboot and will be ready to use in about 60 seconds. (90 seconds if the SCSI option is present)

NOTE: Please check the switch on the power supply to make sure that it is on. The power button will not function if the power supply switch is off.

WARNING: Make sure that the AC Voltage slider on the power supply is set to 115V or 230V depending on the AC Voltage outlets in your area, the unit could be damaged if the wrong Voltage is selected. (115V is used mostly in the US and Canada while 230V is used mainly in European and Latin American countries. Please check with your local power provider to be certain.

Figure 2. Power and Reset buttons



The user interface

The user interface (UI) has been designed with the professional in mind. It is fast, responsive, and to the point; which means it requires very few key strokes to achieve a desired action. It also displays fewer "are you sure" messages that may slow down the cloning session.

Please refer to **Figure 3** as you read the information below.

“Shortcut” buttons (available at all times)

- **START/STOP** Button – Press it twice to begin a cloning operation using the current settings; press the START/STOP button in mid process to abort it. A single key stroke presents a preview screen where you can see the current setting, and decide whether to press it again to begin the capture, or back out to reconfigure.
- The “**Help** (‘?’) button provides context sensitive help and is active at all times. Press it to get specific help on the current screen. If the selection cursor is on the screen, pressing the Help button

will retrieve specific help for the item under the cursor.

- The “**Set**” button is the third “shortcut” button. It brings you to the settings screen where you can change capture modes and other settings of the unit.

“Soft” Buttons

The “soft” buttons are used anywhere selection or toggling are necessary.

- The “**Select**” button is used to select an option (e.g. a partition to copy), to toggle between multiple available options or to enter a sub-menu.
- The “**Back**” button is used to go “up” in the menu system or to cancel out of a given operation.

“Navigation” (Arrow) Buttons

The four Arrow buttons are used for navigation.

- The “**Up**” and “**Down**” buttons are most often used when there is a scrollable window of text and the right side of the screen displays the scroll arrows. This occurs when the amount of information to display exceeds the screen size. There are also screens in the Settings menu where navigating from one option to another requires moving up or down.
- The “**Left**” and “**Right**” buttons are used to navigate from one option to another in the Settings menu. The currently active option will be enclosed by a dashed rectangle.

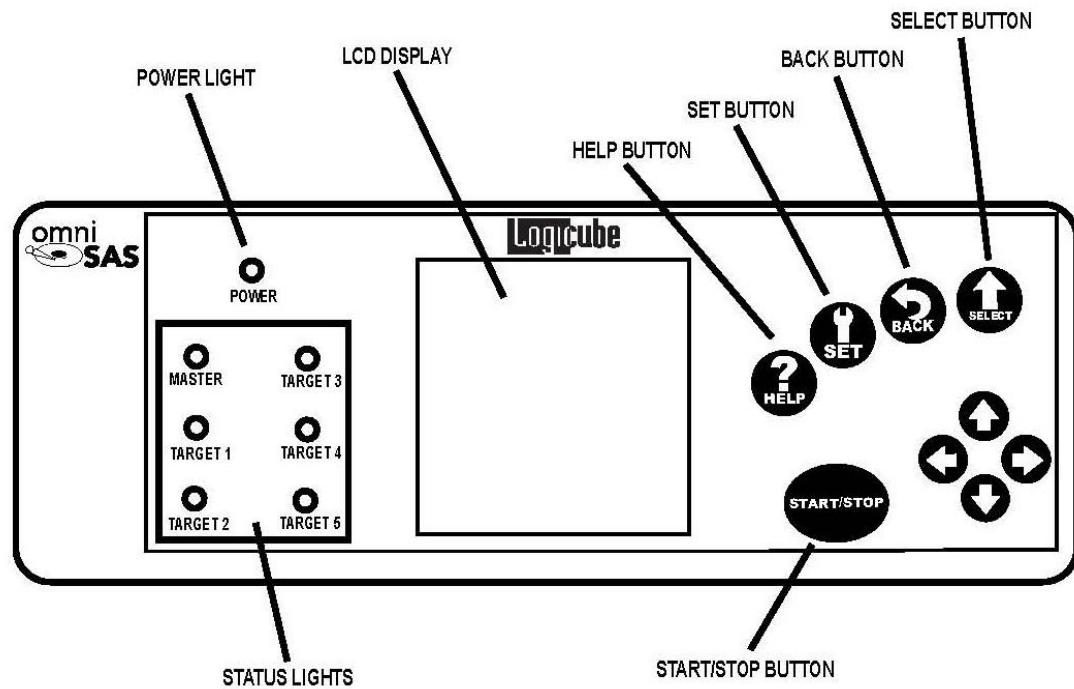
Indicator Lights

The red **POWER** indicator light remains on while the Logicube OmniSAS™ is receiving power.

STATUS indicators for each drive are lit during cloning operations and for any operation that accesses the Master or Target drive. Destination indicators will flash green as data is transferred from one drive to the other.

If a problem or error is encountered during cloning or any other operation the green Status Lights will stop flashing. If this occurs, check the screen for an **ERROR** message and instructions on what to do next.

Figure 3. Buttons and Interface



OmniSAS™ has 7 LED's that indicate the following:

- The RED POWER LED illuminates when power is applied
- The MASTER LED illuminates whenever the master drive is being created or cloned.
- The Five TARGET LED's illuminate whenever data is being copied to the respective drive.
- The MASTER drive LED and all of the LED's associated with the installed Target drives will flash during a wipe process.

3. Cloning Modes and Settings

Main Menu Screen

The main menu screen appears when the Logicube OmniSAS™ is first powered up after it goes through the Self Test. It displays the Splash Screen and two menu options: **About** and **Drives**.

About Screen

Select the About Screen by highlighting “**About**” and pressing the Select button. It will display the serial number of your unit along with the software and firmware versions that are loaded. In addition, the About screen lists all options currently enabled on the unit and provides contact information for Logicube Technical Support.

To return to the main menu, simply press the Back button at any time.

Drive Info

Select the Drive Info screen by highlighting “**Drives**” and pressing the Select button. After approximately 1 minute, the unit will show a list of all the drives it has detected. Use the arrow keys to navigate the list. When a drive is highlighted (and the Select button pressed), the unit will access the drive and report back the drive’s model number, capacity, geometry and other information.

To see the drive’s partition information, highlight “**See More**” and press the Select button to display all of the partitions located on that drive.

To return to the main menu, you may press the Back button at any time.

Cloning

Using the OmniSAS™

The OmniSAS™ can be in one of several modes of operation¹. To set a mode press the “**Set**” button, navigate to the top icon and press the “**Select**” button. You will now see the following screen²:



You will notice the three tabs along the top of this screen labeled “**Clone**”, “**Tools**”, and “**Diag**”. You can navigate between the three tabs when the dashed rectangle is around the label of each tab.

For example, pressing the right arrow button when the dashed rectangle is around the “**Clone**” label will cause the “**Tools**” tab to become active and display the available tools.



¹ Some of the modes are optional and require the purchase of a separate license. Call Logicube Sales for more details at (818) 700 8488.

² Depending on the options you purchased and installed your screens may not match the examples exactly.

Pressing the right arrow navigation button again when the dashed rectangle is around the “**Tools**” label will show the “**Diag**” tab to become the active display.

For more information on this feature, refer to Section 4: OmniDiagnostics in this manual.

CleverCopy™ Mode

This is the default mode. CleverCopy™ supports FAT16 (FAT), FAT32, and NTFS filesystems. It clones ALL partitions on the Master drive to the Target drives, automatically deciding the fastest method possible for each partition found. It scales all partitions (formatted FAT16, FAT32, or NTFS) to fill the Target in its entirety and makes all the necessary adjustments to ensure valid and bootable Target drives. When this mode is selected the Set screen will present the following additional settings:

CleverCopy™ Step-by-Step

1. From anywhere in the menu system press the “**Set**” button to enter the Settings menu.
2. Scroll to the top icon and press the “**Select**” button. The Modes screen appears.
3. Scroll to the “Clever” icon (the graduation cap icon), and press “**Select**” again³.
4. Adjust the “Verify” and “CHS” settings as needed. (These settings are discussed later in this chapter).
5. You may now press the “**Start/Stop**” button twice to start cloning.

NOTE: When CleverCopy™ scales down an NTFS partition, it can only scale it to 55% of the original size.

Selective Partitions™ Mode

This is the most elaborate and most flexible mode. It allows the highest level of control over the cloning process.

Selective Partitions™ mode allows you to select one or multiple partitions to clone. It also allows you to

³You may need to switch from another tab screen to the **Clone** tab to access this option.

choose a unique copy method⁴ to use for each. The available methods are:

CleverCopy™ – The default mode that lets the OmniSAS™ determine the best (usually fastest) way to clone. It is denoted by the graduation cap. It works with all FAT16/FAT32 and NTFS type partitions.

Defragment – Forces the defragmentation of all partition data. This mode uses an advanced defragmentation algorithm to create a Target partition with no gaps and with contiguous files. It works with FAT16/FAT32. Defragmentation is a rather slow process and should be used only when a single copy is required of a given Master drive. In cases where multiple copies are desired, it is much better to use a defragmentation program on a PC for the Master and then move the Master drive onto the OmniSAS™. Note that the CleverCopy™ mode will resort to the defragmentation method if the given partition is FAT16 and a cluster size change is required to create a valid Target partition. (Read more about cluster size later.)

Partition Mirror – Simply streams over the full contents of the selected partition without allowing any partition scaling (Do not confuse this mode with the Mirror Copy™ mode which mirrors the entire Master drive). This method is available for any partition type. This is the only method available to unrecognized partitions. Use this method for FAT16/FAT32 only if the Clever or defragmentation methods fail due to inconsistencies of partition structures.

Convert FAT16 to FAT32 – Converts the selected partition from FAT16 to FAT32 on the fly. This mode is available for FAT16 partitions ONLY. Use only when the given partition is to be used with Windows 98/2000. Some versions of Win95 and all versions of MS-DOS cannot access partitions that use FAT32.

Selective Partitions™ Step-by-Step

1. From anywhere in the menu system press the “**Select**” button to enter the Settings menu.
2. Scroll to the top icon and press the “**Select**” button. The Modes screen appears.
3. Scroll to the “Selective” and press “**Select**” again⁵. The MASTER drive will now power up. Some

⁴Note that not all modes are available for all partition types.

⁵You may need to switch from another tab screen to the **Clone** tab to access this option.

seconds later you will see a list of all partitions found on the MASTER.

4. On the left hand side you will see a blank box next to each partition. Enter the copy mode for each partition you want cloned using the instructions below.
5. Use the scroll buttons to place the cursor by a given partition and press the “Select” button multiple times to cycle among the 6 options.
(*Clever -> Defrag -> Mirror -> Keep Same Size ->Convert to FAT32 -> <blank> -> back to Clever*).

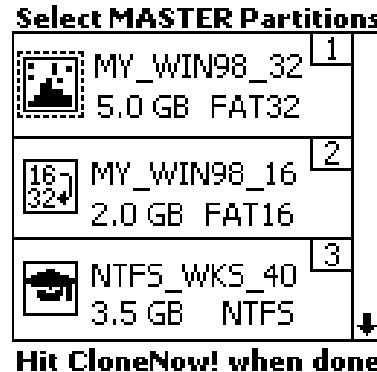
See **Figure 4** below for an example.

Note: For NTFS partitions, only CleverCopy™ or Mirror Copy™ may be used. For FAT32 partitions, CleverCopy™, Mirror Copy™ or Defragment may be used. For FAT16 partitions, CleverCopy™, Mirror Copy™, Defrag or convert to FAT32 may be used.

Figure 4: Selective Copy Modes

	CleverCopy	Use the CleverCopy algorithm for this partition
	Defragment	Defragment this partition on-the-fly (FAT16/32 only)
	Mirror	Simple partition mirror (no adjustments)
	Convert to FAT32	Convert this partition to FAT32 (applies to FAT16 only)
	KeepSame Size	Use CleverCopy algorithm but maintain partition size
	None	Do not copy this partition

A sample screen might look like the partition list below:



Here three partitions have been selected for cloning. The first has a volume label MY_WIN98_32, is a 5.0 GB FAT32 type, and will be defragmented as it is copied to the Targets. The second, MY_WIN98_16, is a 2.0 GB FAT16 and will be converted to FAT32 on the fly. The third, NTFS_WKS_40, is a 3.5 GB NTFS and will be CleverCopied to the Targets.

6. Scroll to other partitions and repeat the above step. Note that it is OK to assign unique cloning modes to each selected partition.
7. Adjust the "Verify" and "CHS" settings as needed. (These settings are discussed later in this chapter).
8. When done, press the "Start/Stop" button twice to start cloning.

NOTE: When multiple copies are required, all you need to do is change the TARGET drives, and press "Start/Stop" twice. Your last selections will be used. If the unit senses that the MASTER drive was changed (by reading the serial number of the MASTER), it will again return you to the selection screen, where you can specify the method of copy for each partition.

NOTE: If you wish to change the last used settings (and the MASTER drive did not change), follow the "Selective Partitions™ Step-by-Step" instructions above.

Mirror Copy™™ Mode

This mode simply makes a bit-by-bit copy of the Master drive. It does not adjust any values. This

mode is recommended for non-Windows partitions like UNIX, LINUX and other such systems.

NOTE: Drives in a RAID array also need to be cloned using Mirror Copy™. See the Raid Cloning Guidelines section of this chapter for more information on cloning drives in a RAID array.

Mirror Copy™ Step-by-Step

1. From anywhere in the menu system press the “**Set**” button to enter the Settings menu.
2. Scroll to the top icon and press the “**Select**” button. The Modes screen appears.
3. Scroll to the “Mirror” item and press “**Select**” again⁶.
4. Adjust the “Verify” and “CHS” settings as needed. (These settings are discussed later in this chapter).
5. Select either “RAID Mirror” or “Percentage Mirror”. RAID Mirror is used for RAID drives.

NOTE: See the Raid Cloning Guidelines section of this chapter for more information on cloning drives in a RAID array.

Percentage Mirror copies a user selectable percentage of the drive. When “Percentage Mirror” is selected, a screen appears asking you what percentage of the Master drive to clone. Use the Up/Down scroll arrows to adjust this value in increments of 5%. If less than 100% is chosen for the **FRONT** of the drive, the unit will also ask for a percentage from the **REAR** of the drive.

6. You may now press the “**Start/Stop**” button twice to start cloning.

Master Manager™ Mode

This is a special mode that assists in the creation of Master drives. It lets the user choose exactly one partition from the drive in the Master position (referred to henceforth as the **Source** drive) and clone it to the drive in the Target 1 position (referred to henceforth as the **Destination** drive).

Master Manager is a useful tool to aid in the creation of a multi-partition Master drive. Many MIS technicians like to store multiple partitions (e.g. one

⁶You may need to switch from another tab screen to the **Clone** tab to access this option.

for accounting, one for marketing, etc.) on a single Master drive. When a new PC is to be configured or a drive crash occurs, all the technician needs to do is select that partition and clone it. The tool is also useful to create backups of important partitions.

The OmniSAS™ can hold up to 24 partitions on one Master drive. Drives over 750GB in size have been tested with Master Manager successfully.

Master Manager prompts the user to select exactly one partition on the **Source** drive. It then prompts the user to either select an existing partition on the **Destination** drive to overwrite, or to append the selected partition at the first available space on the **Destination** drive.

WARNING: Please use this mode with care as the **Destination Drive** (your multi-partition master drive) is altered in the process.

Master Manager™ Step-by-Step

NOTE: To create a Master drive using Master Manager, you must start with an unformatted drive. (Use the Wipe Mode, FDISK or a third party tool to wipe out the intended drive's partition table.)

1. From anywhere in the menu system press the Set button to enter the Set menu.
2. Scroll to the top icon and press the “Select” button. The Modes screen appears.
3. Switch to the “Tools” tab. Scroll down to the “Master Manager” item (the Crown) and press “Select” again.
4. Press the “Start/Stop” button twice to start cloning. You will be warned that continuing will modify your **Destination** drive. If you are ready to start, choose “Yes” to continue.
5. Both drives will now power up. After a few seconds the unit will display a list of all **Source** partitions.
6. Choose exactly one **Source** partition by placing the cursor by the desired partition. Press “Select” to toggle among the cloning methods exactly as you would in “Selective” mode.
7. Press “Start/Stop”
8. Now **Destination** partitions (if any) are displayed.
9. Place the cursor by a **Destination** partition you want to overwrite or scroll down to the “Add

Partition" item. Press "Select" to choose the desired partition or to add a new partition.

10. Press "Start/Stop" to begin cloning.

RAID Cloning Guidelines

Introduction

This section briefly describes how to clone RAID drives using the Logicube OmniSAS™ with software version 4.08 or above.

Logicube has developed the procedure outlined in this section using disk drives from RAID arrays that use a RAID controller compliant with the SNIA (Storage Networking Industry Association, DDF (Common RAID Disk Data Format).

Other types of RAID controllers may not clone successfully using OmniSAS.

More information regarding the DDF can be found on the SNIA website at the following URL;
http://www.snia.org/tech_activities/standards/curr_standards/ddf/

To find out if your RAID controller is a SNIA DDF Compliant controller, please contact your computer manufacturer or RAID controller manufacturer.

NOTE: The Master and Target drives must be from the same manufacturer, be the same model, and have the same total sector value.

RAID Cloning – Step by Step

Depending on the RAID level configured on the drives, the following methods should be followed:

- RAID 1 – Data on a RAID 1 level is mirrored exactly across the participating drives in the array. This makes it possible to clone data from one Master drive to multiple Target drives.
- RAID NN (Any other RAID level aside from RAID 1. Some examples are 0, 5, 6, and 10)
 - Since data on other RAID levels is not mirrored exactly across participating drives, each drive from the Master set must be cloned separately.

RAID 1 Cloning

Two Master drives set as RAID 1 and two Target drives (identical to the Master drives) are required. Follow the steps below to clone drives in a RAID 1 array:

1. Create a RAID 1 pair with the two Target drives on the same hardware where the Master drives came from. The SNIA DDF compliant controller will place the RAID configuration on both hard disk drives.
2. Attach either of the two Master drives to the Master position of the Logicube OmniSAS™.
3. Attach one Target drive to the Target 1 position and the other Target drive to the Target 2 position of the Logicube OmniSAS™.
4. Perform a Mirror Copy™ of the Master drive. With software version 4.08 and above, a configuration page will appear with a choice to select either “RAID Mirror” or “Percentage Mirror”. Select the “RAID Mirror” option and start the cloning process.

NOTE: See the [Mirror Copy™ Mode](#) section of this chapter for more information on the Mirror Copy™ Mode setting.

RAID NN Cloning

For all other RAID levels, each Master drive must be cloned to a Target drive using the Mirror Copy™ mode. Other RAID levels (Aside from RAID 0) may have more than two drives in the RAID array. The steps and example below are for a RAID 6 configuration with 4 drives in the RAID array. Your RAID configuration may differ from this example.

1. Label each Master drive on the RAID array (in this 4 drive example, label them “Master 1”, “Master 2”, “Master 3”, and “Master 4”.

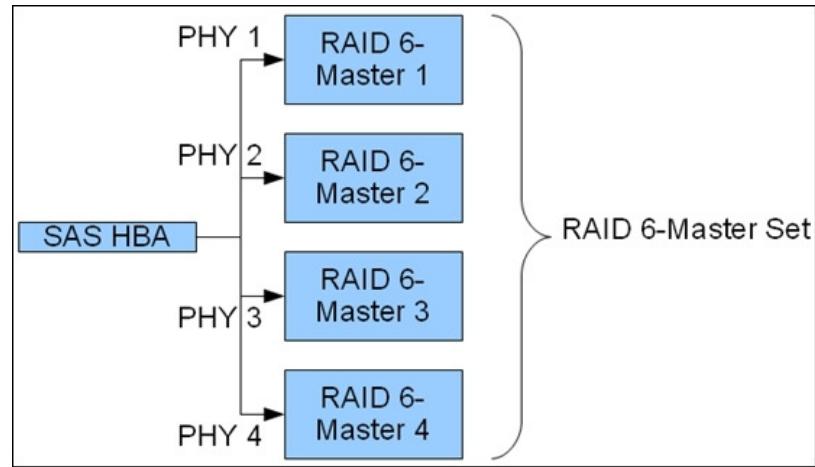


Illustration 1: RAID 6 Master Set Creation

2. Create a RAID 6 array (or whichever RAID level you are using) with the 4 Target drives. Label each drive the same way as you did with the Master drives (in this example, label them "Target 1", "Target 2", "Target3", and "Target 4"). The SNIA DDF compliant controller will place the RAID configuration on all hard disk drives.
3. Attach the drive labeled "Master 1" to the Master position on the Logicube OmniSAS™.
4. Attach the drive labeled "Target 1" to the Target 1 position on the Logicube OmniSAS™.
5. Perform a Mirror Copy™ of the Master drive. With software version 4.08 and above, a configuration page will appear with a choice to select either "RAID Mirror" or "Percentage Mirror". Select the "RAID Mirror" option and start the cloning process.

NOTE: See the Mirror Copy™ Mode section of this chapter for more information on the Mirror Copy™ Mode setting.

6. Repeat steps 3 through 5 with the remaining Master drives (Master 2, 3, and 4 and Target 2, 3, and 4). Ensure that the Target drive matches the Master drive (for example, Target 2 with Master 2).

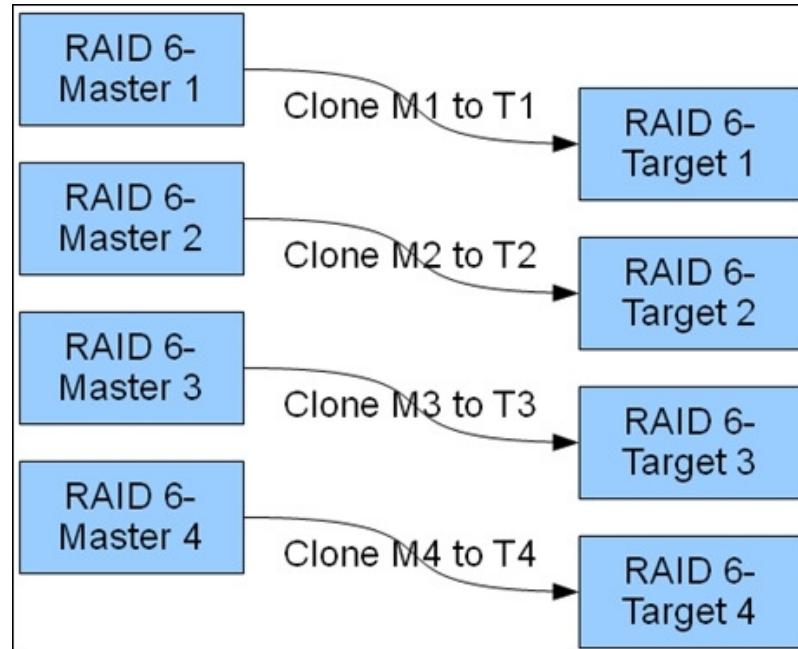


Illustration 2: RAID 6 Cloning

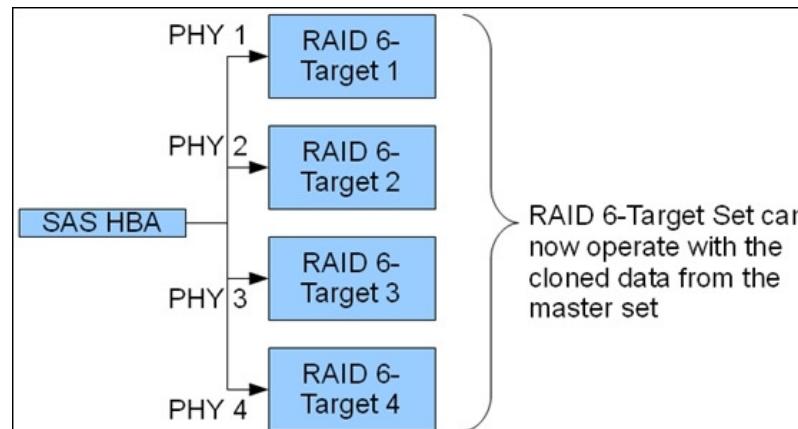


Illustration 3: Operational RAID 6 Target Set

Cloning Windows 7

With the release of the Windows 7 Operating System, Microsoft has added some security features to protect the integrity of the partition. These features can cause problems when cloning Windows 7 with CleverCopy™ mode.

This section will discuss the best ways to clone Windows 7 hard drives.

SCENARIO 1: When the Master and Target drives are the same size

With this scenario, you can use CleverCopy™ mode to clone the Windows 7 hard drive. Since the Master and Target drives are the same size, the size of the partitions should remain the same.

SCENARIO 2: When the Target drive is larger than the Master drive and Windows 7 is a non-OEM installation

Most non-OEM Windows 7 installations will have two partitions. The first partition is a 100 MB 'System Restricted' partition followed by the Operating System partition. The following steps are necessary for creating correct and bootable clones:

1. Use Selective Partitions™ mode.
2. The Logicube OmniSAS™ will report two partitions. They should be cloned as follows:
 - a. 100 MB NTFS: Mirror (Keep Size may be used as a second option)
 - b. 'N' GB NTFS (Operating System partition): CleverCopy™

SCENARIO 3: When the Target drive is larger than the Master drive, and Windows 7 is an OEM installation

This scenario is seen in most OEM installations of Windows 7. PC manufacturers place a recovery partition on the disk so users can restore the PC to its original, factory installation. The following steps are recommended to create a bootable clone:

1. Use Selective Partitions™ mode.
2. The Logicube OmniSAS™ will report two or more partitions. One of the partitions may be labeled 'Recovery'. They should be cloned as follows:
 - a. Any partition except for the Operating System (Recovery, Utility, System Restricted, etc.): Mirror (Keep Size may be used as a second option)
 - b. 'N' GB NTFS (Operating System partition): CleverCopy™.

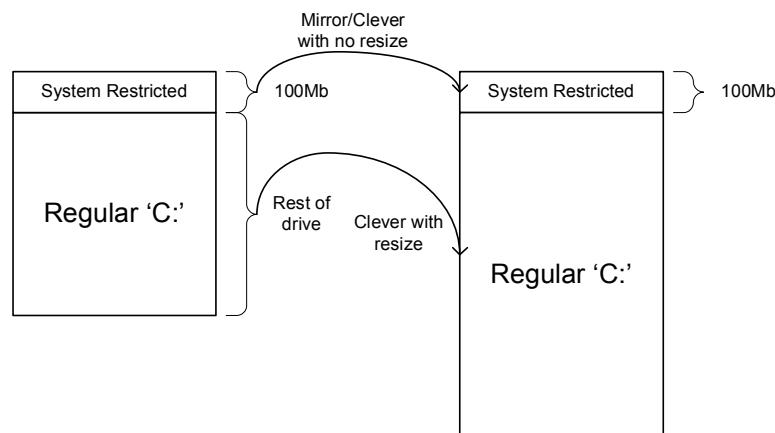
Background Information

Windows 7 non-OEM DVD Installation

When installing Windows 7 from a non-OEM DVD, the default partition layout will look like the following:

- A special 'System Restricted' partition 100 MB in size
- The Regular OS partition follows

In order to create a bootable clone, it is necessary to keep the 'System Restricted' partition the same size as what is on the Master drive. Resizing 'C:' (OS partition) works well.



The 'system restricted' partition contains the Windows 7 bootloader and it knows about 'C:' seemingly by an absolute offset, therefore it is necessary to keep the starting location of 'C:' within the drive the same. The same reasoning goes for the other scenarios above; this is why we always keep the starting offset of 'C:' the same as the source drive.

Cloning Windows Vista™

With the release of the Windows Vista™ operating system in late 2006, Microsoft has added some security features to protect the integrity of the partition. These features can cause problems when cloning Vista with Clever Clone mode.

This section will discuss the best ways to clone Windows Vista hard drives. These instructions apply to all flavors of Windows Vista (Windows Home Basic, Windows Home Premium, Windows Business and Windows Ultimate).

NOTE: Software dated November 2007 or later and NTFS Clever Copy mode need to be installed on the OmniClone® Xi in order to Clever clone Windows Vista.

Vista Installations

The following Vista installations are supported by Clever Clone mode:

- Upgrade of a Windows XP SP2 drive.
- Dual Boot scenario with Windows XP on the same partition.
- Installation on a blank drive.

As of this writing, the following Windows Vista scenarios are not yet supported by Clever Clone mode, but valid target drives can be cloned with Mirror Copy™ mode:

- BitLocker™ technology – a new drive encryption scheme by Microsoft.
- Other multi-boot scenarios (i.e. with Linux).
- The Windows Longhorn Server

NOTE: New software updates are constantly being developed. Please check with www.logicube.com periodically for new software updates.

Cloning Scenarios and how to handle them

A Simple Vista partition with logical drivers

No extra treatment is required to clone a simple Vista partition.

Vista with RE (Recovery Environment)

Assuming the RE partition is Hidden (type 0x27) as is specified by Microsoft, no special handling is required to yield bootable target drives. The OCXi will detect and copy the hidden RE partition correctly followed by a CleverCopy of the Vista bootable partition.

If the Recovery partition is of a simple (type 0x07) (non-hidden partition), a different cloning method is necessary. Ref. Figure 3b.

Choose Selective Partitions™ mode on the OCXi and assign the “Keep Size” method to the first (RE) partition, and regular Clever method to the Vista OS partition:

	1. RE	NT
	2. VISTA	NT

Fig 3b Selective partition Table

XP/Vista dual boot

XP partition comes before Vista partition: Use the Selective Partitions™ mode on the OCXi unit. Set the clone method to “Keep Size” for the XP partition and CleverCopy for the Vista OS partition.

Vista partition comes before XP partition: Use CleverCopy mode. No extra treatment is needed.

Selective Partitions™

Selective Partitions™ will work correctly with Master Manager drives provided they have been built according to the directive defined at the beginning of the Master Manager section above. It will also work correctly with Vista drives that have multiple partitions. No special handling is required.

Master Manager™

In order to create a valid Master Manager™ drive with Vista partitions, it is absolutely necessary to apply the Bcdedit treatment to each Master drive prior to cloning.

It is OK to mix Vista and Non-Vista images on the same Master Manager™ drive.

NOTE: When building a Master Manager drive with Windows XP, 98 & 2K operating system partitions, you must edit the BCD (Boot Configuration Data) if Vista will be one of the partitions on the Master Drive you are creating. If so, follow the Master Drive BCD Vista Preparation below.

Master Drive BCD Vista Preparation

Edit the BCD (Boot Configuration Data) file in the following way:

1. Boot the Master drive and log in as a user with administrative rights.

2. Press the Start button (the Microsoft Orb) and type **cmd.exe** at the search window. The **cmd.exe** application will show up at the top of the box. Right-click it and run it as an administrator (or with elevated rights). A DOS window will open.

3. Now type the following commands in the DOS Window:

```
Bcdedit /set {bootmgr} device boot <enter>
Bcdedit /set {default} device boot <enter>
Bcdedit /set {default} osdevice boot <enter>
Bcdedit /set {memdiag} device boot <enter>
Bcdedit /set {ntldr} device boot <enter>
(this line is only necessary for drives with XP/Vista dual boot setup)
```

4. If typed correctly (with admin rights!), the response will be successful in each case. These commands change the BCD file in a way that allows Vista to boot even if some of the drive's geometry has changed. It will not cause a rollback, will not request the license key again, or perform a SID change pass.
5. Now shut down the computer and disconnect the Master drive. Your Master drive is now ready for cloning.

Reference

1st. Option - Master Drive BCD Vista Preparation

Edit the BCD (Boot Configuration Data) file in the following way:

1. Boot the Master drive and log in as a user with administrative rights.
2. Press the Start button (the Microsoft Orb) and type **cmd.exe** at the search window. The **cmd.exe** application will show up at the top of the box. Right-click it and run it as an administrator (or with elevated rights). A DOS window will open.
3. Now type the following commands in the DOS Window:

```
Bcdedit /set {bootmgr} device boot <enter>
Bcdedit /set {default} device boot <enter>
Bcdedit /set {default} osdevice boot <enter>
Bcdedit /set {memdiag} device boot <enter>
```

Bcdedit /set {ntldr} device boot <enter>

(this line is only necessary for drives with XP/Vista dual boot setup)

4. If typed correctly (with admin rights!), the response will be successful in each case. These commands change the BCD file in a way that allows Vista to boot even if some of the drive's geometry has changed. It will not cause a rollback, will not request the license key again, or perform a SID change pass.
- 4.
5. Now shut down the computer and disconnect the Master drive. Your Master drive is now ready for cloning.

2nd. Option - Sysprep Instructions

This process "rolls back" the Master drive to the stage in the installation process just before entering the product license keys. To run:

1. Boot the Master drive and log in as a user with administrator rights.
2. Press the Start button (the Microsoft Orb) and type **c:\windows\system32\sysprep\sysprep.exe** at the **search** edit box. The **Sysprep.exe** file will be displayed at the top of the box. Right-click it and run it as an administrator (or with elevated rights).
3. Set the Cleanup Action to OOB, and choose to Shutdown after the roll back, as shown in the following screenshot:



4. The "Generalize" switch is optional. It will not affect the success of the cloning process, but is recommended for the following reasons:

- It will invoke the PnP mechanism of Vista upon booting the cloned targets. This is a good feature if the targets are to be placed in PCs of widely varying hardware devices (e.g. Video cards, network cards, motherboards, CPUs etc.).
- It will force application of new SID values system-wide. This is desirable if two or more of the cloned drives will “live” in the same Active Directory domain.

5. The computer will turn off. Remove the Master drive, and do not boot it again. Your Master drive is now ready for cloning.

Optional Preference Settings

In addition the different cloning modes, there are preference settings that can be used to adjust the behavior of the cloning operation. Each of these preference settings is accessible through the Settings menu, which can be viewed at any time from anywhere in the menu system by pressing the Set button.

NOTE: Not all preference settings are available in every cloning mode.

Verify

Many of the modes will allow you to use a sub-setting called “Verify”. If this mode is set, every sector written to the Target drives is read back and verified. This practically guarantees the validity of the Target drive data as well as scans for bad sectors. Without verification, the OmniSAS™ cannot detect bad sectors on the Targets. Any data cloned onto bad sectors may be corrupt or incomplete.

NOTE: With newer drives (manufactured in the last 2 years) this problem is virtually non-existent since the drives employ extensive on-the-fly bad sector detection and re-allocation.

Engaging the verification feature slows the speed of cloning by a factor of two or more. If a bad sector is detected on the Targets (with Verify turned on), the cloning process will abort with an error message.

NOTE: Logicube recommends against using drives with bad sectors as new defects are likely to develop.

To use Verify, scroll to the Verify icon in the Settings Menu, and press the “Select” button. Verify is available in CleverCopy™, Selective Partitions™ and MasterManager modes.

Verify Settings

- **None** (Default) - No data verification is performed.
- **100%** - Full data verification is performed on each Target drive.

CHS Translation

CHS Mode sets the geometry (**Cylinder**, **Head** and **Sector**) translation used on each Target drive. CHS information is stored in the partition table of the hard drive and is used by the BIOS to determine from which partition to boot.

The correct setting will depend upon the capacity of the Target drive and on the BIOS of the PC in which it will be used. Check with the hard drive and PC manufacturer to determine which CHS mode is best as different BIOS systems use different translation methods for large capacity drives.

CHS is available in CleverCopy™ and Selective Partitions™ modes. To use CHS Translation, scroll to the CHS icon in the Settings Menu for either Clever or Selective cloning and press the “Select” button to scroll through the CHS options.

CHS Translation Settings

Following are the CHS modes supported by the Logicube OmniSAS™:

LBA (Default) – This CHS Mode will work for most hard drive and PC combinations and should be used unless otherwise indicated.

Large – Also known as Extended CHS (ECHS) mode. It is used on all Compaq and Samsung computers, some IBM PC's, IBM Thinkpad laptops, some newer Dell laptops, and possibly other computers. It should also be used whenever a Phoenix BIOS version 4.0 or earlier is encountered.

LBA 8.5 and **Large 8.5** – These settings force all partitions to remain below the 8 GB mark. This is useful with Legacy motherboards that cannot support drives larger than 8.5 GB.

LBA-1, LBA-2, Large-1 and Large-2 – These settings instruct the Logicube OmniSAS™ to “shave off” one or two cylinders from the total drive size when constructing the Target partition tables.

NOTE: It is important to use -1 or -2 settings for all Windows 2000 and Windows XP installations. These operating systems use the unallocated space to store certain tables required for Active Directory and sometimes for Dynamic Partitioning.

NOTE: Most of the time, blocking out one cylinder is enough but two may need to be blocked out to achieve good results.

Security Identification Number (SID) Issues

The Windows NT, Windows 2000 (previously known as NT 5.0) and Windows XP operating systems attach a SID (Security Identification) number to all files and directories on the hard drive for security and authentication purposes. The same SID numbers are found in the system registry in various locations.

When such drives are cloned, the SID numbers get copied without change. If the Target drive participates in the same network as the Master, there will be a security breach, which will cause undesirable network behavior.

To avoid this issue with Windows NT and Windows 2000, we recommend a freeware SID changer called NewSID. The latest version can be downloaded at www.sysinternals.com. Logicube is in no way associated with SysInternals and cannot offer any technical support for NewSID. Other commercial SID changers can also be found at major software outlets.

For Windows XP, you must use Microsoft's Sysprep utility, which is available as a free download from the Microsoft website at www.microsoft.com.

4. OmniDiagnostics™

Introduction

The Logicube OmniSAS™ has optional software packages that are not part of the standard unit⁷. Foremost of these is **OmniDiagnostics™**, an optional feature that allows Target drives to be wiped clean of data.

Enabling OmniDiagnostics™

All optional software packages are already inside your Logicube OmniSAS™ (and are automatically updated when you install a newer software version). To use an option like Omnidiagnostics™, it first needs to be enabled.

To enable OmniDiagnostics™ on your Logicube OmniSAS™, contact Logicube sales to purchase a license key that is unique to your unit.

OmniDiagnostics™ Features

Wipe Target Mode

The Wipe Target mode erases all data on the Target drive. This may be required when discarding drives that contain sensitive information to which you do not want others to have access, e.g. financial information, trade secrets, etc.

Wipe writes a pattern over the whole Target drive **2 X n+1** times, where n is the selected number of

⁷ As of this writing, the only optional feature available is Omnidiagnostics. Other features may become available in the future. Check www.logicube.com periodically for updated information.

iterations of all 0's and all 1's. The last pass then writes the chosen pattern to every byte of the drive.

For example, if you set the number of passes (the value of n in the above formula) to 1, Wipe will perform a total of three passes, first writing all 0's then again writing all 1's. Then one more pass will be made this time writing the chosen pattern.

Set the number of passes to 0 for a single pass of the chosen pattern. This method is acceptable for quickly wiping a drive where removal of sensitive information is not an issue.

Set the number of passes to 1 and the pattern to RANDOM if you wish to erase data according to Department of Defense (DoD) specification M-5220.

Wipe Settings

The following settings are used in configuring Wipe Target mode:

Passes – Determines how many iterations of all 0's and all 1's are performed. The default is 0. Set the value to 1 for compliance with DoD M-5220.

Value – Select the value to be written on the last pass. The options are 0xf6, 0x00, 0xff, and Random (DoD default). (The Random setting will fill the Target drive with a pseudo random pattern).

Wipe Target Step-by-Step

1. Attach the drive(s) to be erased to the Target position(s). Attach a scratch drive (a drive suitable for testing) to the Master position.
NOTE: Do not use an actual Master drive in the Master position. A pattern will be written to the beginning of the drive which will corrupt any data residing on it.
2. From anywhere in the menu system press the “**Set**” button to enter the Settings menu.
3. Scroll to the top icon and press the “**Select**” button. The Modes screen appears.
4. Scroll to the “**Wipe**” item (in the Diag menu), and press “**Select**” again⁸.
5. Adjust the “**Passes**” and “**Value**” settings as needed. (These settings are discussed in the previous section titled “**Erase™ Settings**”).

⁸The OmniDiagnostics™ option needs to be installed for Wipe to be available.

6. Press the “**Start/Stop**” button twice.
7. A message will appear stating that portions of your Target drive will be overwritten. If you are prepared to continue, choose “<Yes>”. If you wish to abort the operation, choose “<No>”.
8. If “<Yes>” is chosen, a second message will appear stating that you are about to erase the Target. If you wish to continue, choose “<Yes>”. If you want to abort the operation, choose “<No>”.
9. If “<Yes>” is chosen, the Wipe Target operation will begin and a status screen will appear.
10. The Logicube OmniSAS™ will notify you when erasing is complete. Press the Back button to return to the main menu.

5. Software Loading Instructions

Logicube OmniSAS™ Software Updating Procedures

New and improved software will appear from time to time on our web site at www.logicube.com. It is possible for a user to update the operating software in the field.

NOTE: The software is downloaded from a PC into the OmniSAS™ via a USB port connection.

Loading Software through the USB Port

Download the software update from the Logicube web site and connect a USB cable between the OmniSAS™ and the host PC with the software update.

The OmniSAS CF card will show up as a drive on the PC. Proceed to copy the new software to the CF drive that is mounted on the PC.

Disconnect the USB cable from the OmniSAS™ and reboot the OmniSAS™.

Alternatively, you can remove the CF from the bay in the back of the unit and plug the CF directly into a CF reader attached to the PC. Copy the new Software onto the CF card and re-insert it into the CF drive bay in the back of the OmniSAS™. Reboot the OmniSAS™ to complete the operation.

NOTE: Please contact Logicube Technical Support at (818) 700-8488 X3 if you have any trouble with the software update.

6. Frequently Asked Questions and Answers

Q. Why does the OmniSAS™ emit one beep when powered up? Is this Normal?

A. Yes, this is normal. The beeps occur as part of the unit's self test.

Q. How does the OmniSAS™ determine the size of partitions on the Target drive?

A. In the default CleverCopy™ mode, all known partitions (FAT16/FAT32/NTFS) are scaled proportionally to the ratio of Master/Target size. All unknown partitions (e.g. HPFS, UNIX etc.) are mirrored, that is they maintain their size. Please note that FAT16 partitions cannot exceed 2.1GB when scaled up, nor be smaller than 32MB when scaled down.

Q. Can the OmniSAS™ defragment a partition?

A. Yes. Use the Selective Partitions™ mode, scroll to the desired partition, and toggle the icon to the left of it until the defrag symbol appears. Press the “**Start/Stop**” button twice to start the cloning session. Defragmenting is somewhat slower than other cloning methods, and is currently available for FAT16/FAT32 partitions only.

Q. Can the OmniSAS™ clone to dissimilar drives?

A. Yes. The OmniSAS™ will take care of all the necessary adjustments of Target drive structures to ensure the drive (of any size) will be valid and bootable. Many mixtures of Master and Target drive sizes (up to 250GB) were tested, and found to be valid. The above is true for all Master drives that contain FAT16/FAT32/NTFS type partitions. Unknown partition types are cloned in mirror mode, and typically require identical (or very similar) Master and Target drives to guarantee a successful clone.

Q. Why do I sometimes see transfer speeds greater than 2.5GB/min., and other times as slow as 200MB/min.?

A. There are many factors that determine transfer speed:

- **The age of the drives** – The speed of the operation is governed by the slowest drive in the system. If an old drive is used, chances are it cannot sustain high transfer speeds. Newer drives have faster electronics and larger caches, and can sustain rates as high as 16MB/sec.
- **The type of operation performed** – When cloning FAT16 partitions, it is sometimes necessary to change the cluster class of the partition. In such cases, the OmniSAS™ “engages” a more complex algorithm to ensure proper alignment of structures on the Target. This results in a slower process.
- **Cloning to more than one Target drive** - This can also decrease the cloning speed, especially if the Targets are significantly different in speed and/or capacity. Cloning to one

Target at a time yields the fastest speeds, which decrease slightly as more Target drives are added.

Q. Can the OmniSAS™ clone file systems such as UNIX, and HPFS?

A. Yes, but results are guaranteed only if cloned between identical drives. However, it is reported that UNIX partitions will self-repair upon the first boot.

Q. Do Target drives have to be partitioned and formatted prior to copying?

A. No. Target drives need not be partitioned or otherwise treated. The OmniSAS™ disregards everything on the Target drive, and re-formats and partitions the Target on-the-fly.

Q. My Target drive will not boot? Why?

A. Please check several things:

- If the Target drive is Larger than 4GB, and is hosted by a PC with a Phoenix BIOS dated earlier than Nov. 1997, you may need to set the CHS translation setting to Large, and clone again.
- If this is not the case, please check that the above setting is NOT set to Large, but rather to the default setting: LBA.
- Make sure that the first partition selected for cloning on the Master consists of a valid operating system. Since it is perfectly OK to select a data-only partition to be cloned, one cannot expect to be able to boot from such a Target.
- The Master drive is corrupted. This may not show-up with casual booting of the Master, but problems such as cross-linked clusters can cause serious cloning errors. We recommend checking every Master with Scandisk or Chkdsk prior to cloning.
- If the boot partition is WIN2000 or WINXP, you might need to change the CHS setting from LBA or LARGE to LBA-1 or LARGE-1. This leaves some unallocated space at the end of the drive for Active Directories and other processes.

Q. All but the first partition is missing from the Target drive? How did that happen?

A. This is usually a result of a wrong CHS translation setting. Press the Set button, and scroll down to the CHS translation mode item. Toggle to the other state (LARGE or LBA), and try to clone again.

Q. How does the OmniSAS™ handle bad sectors on the Master and Target?

A. Bad (or "weak") sectors on the Master are handled in the following way:

- The OmniSAS™ will abort the cloning process upon encountering the first bad sector. Note that the OmniSAS™ will still make several attempts to read the bad sector in question, but unless a perfect read was achieved, the process will abort.

Bad sectors on Targets are handled as follows:

- If the Verify setting is disabled, the OmniSAS™ will not detect bad sectors on the Target. Note, however, that newer drives use automatic reallocation and will rarely exhibit a bad sector, and thus reduce the probability of a problem to a negligible amount.
- With the Verify setting set, the OmniSAS™ will abort the operation upon detecting the first bad sector.

Q. Are NT 4GB FAT16 partitions supported?

A. Yes, using Mirror Copy™ Mode only.

Q. How does the OmniSAS™ handle NT Security Identification ID (SID) duplication issues?

A. The OmniSAS™ duplicates the SID. It is recommended that a SID changer be installed on the Master drive, so that the next time the Target is booted-up, all SID's will be replaced with fresh ones. Please refer to the "**Security Identification Number (SID) Issues**" section in **Chapter 4: Cloning Modes and Settings**.

Q. Can you briefly explain the difference between Mirror Copy™ and CleverCopy™?

A. Mirror Copy™ merely copies all sectors in a given partition (or drive) from the beginning to the specified percentage. It does not look at drive structures, and can thus copy any type of known or unknown data. Since Mirror Copy™ does not determine where useful data starts and stops, it ends up copying every sector on the drive, a time consuming operation.

CleverCopy™ analyzes the drive structures, and copies only sectors that are occupied by useful files and data. It also adjusts the various drive structures to assure a valid and fully partitioned Target drive. CleverCopy™ is by far the most recommended mode of cloning.

Q. Can I copy from a larger drive to a smaller drive?

A. Yes, especially with FAT formatted drives, as long as the data content of each partition fits into the scaled down size of its corresponding partition. Otherwise, an error message is displayed. NTFS partitions can only be scaled down to 55% of their original size due to the Master File Table (MFT).

Q. Can I clone drives with virus protection software installed

A. Yes. But remember to decline the "repair" of the Target drive should a virus protection program complain about altered Master boot record etc.

Q. The OmniSAS™ does not recognize my Master (or Target) drive? What can be done?

A. Make sure that the drive jumpers are set as a Single Master (if you are using an IDE/EIDE Master). SCSI Master drives and Targets will not normally need special jumper settings. Each Target position has its own SCSI channel, which eliminates any worry about SCSI ID conflicts and similar problems. If needed, drive jumper settings can be found at the drive manufacturer web site. Also, make sure all cables (data and power) are connected properly to BOTH drives.

Q. Why do I have an un-partitioned free space at the end of my Target drive?

A. This typically occurs when the Master drive has FAT16 partitions only, and the Target is much larger. FAT16 partitions cannot scale to more than 2.1GB each. FAT32 and NTFS partitions do not have this limitation and will always be scaled up to fill the Target drive (unless the CHS Translation setting is set to LBA -1/-2 or LARGE -1/-2. These settings leave the last cylinder or the last two cylinders free at the end of the drive).

This can also happen if Mirror Copy™ is used to clone from a small drive to a larger Target drive.

Q. Can the OmniSAS™ handle dual boot scenarios in conjunction with NTFS.

A: Yes. The OmniSAS™ will clone a FAT16 followed by either an NTFS, or another FAT16 partition correctly, and adjust all the necessary structures, so that dual booting is possible. It will also handle dual booting if the different Operating Systems reside on the same partition.

Q: Why do I receive a "Not Enough Memory" error when running Scandisk or Defragment on cloned Windows 9.x systems?

A: This issue only applies to FAT32 partitions. The error occurs because both Scandisk and Defragment cannot handle the increased number of clusters that exist when Targets larger than 8 GB have been cloned from Master drives smaller than 8 GB.

To prevent the problem from occurring, change the Logicube OmniSAS™ default CleverCopy™ mode to Selective Partitions™. Then select the Defragment copy method for the partition(s) you wish to clone. This will resize the clusters and reduce their number.

Q: Why does my cloned Windows 2000 or Windows XP partition boot to a blue screen?

A: The CHS mode for cloning needs to be set to LBA-1 or LARGE-1. If one of these was used, then set the CHS mode to LBA-2 or LARGE-2. You may also need to set the Speed option to a lower setting.

Q: Why do I get the error "Can't fit data to Target" when cloning between drives of the same size?

A: The drives may be from different manufacturers and the Target actually somewhat smaller than the Master. Also, the Master drive may have some data at the very end of the partition. This would prevent it from scaling down.

We recommend that you use a defragment utility on the Master drive before cloning it to the Target again.

Q: My cloning session stops with the error "Error initializing/writing NTFS data." Why?

A: This error means that NTFS CleverCopy™ has encountered corrupt data in the boot sector, MFT or Volume Bitmap of the Master drive. The drive may still boot in a PC, however.

Q: My cloning session always stops at a certain point with an "ERROR 120" or "ERROR 123" message. Why?

A: "ERROR 120" occurs when a bad sector is encountered on the Master drive. "ERROR 123" usually occurs when Verify is turned on and a bad sector is found on the Target drive.

Q: Why does the cloning session stop with an "Invalid MBR" error message?

A: This error comes up when the partition table or boot sector contains corrupt data. Despite the error, the Master drive may still boot in a PC.

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